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Son et al.

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(54) **ELECTRONIC DEVICE COMPRISING ORGANIC COMPOUND HAVING P-TYPE SEMICONDUCTING CHARACTERISTICS**

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(51) Int. Cl. ⁷ **H01L 35/24; H01L 51/00**

(52) U.S. Cl. **257/40; 428/411.1**

(58) Field of Search **428/411.1; 257/40**

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Primary Examiner—George Eckert

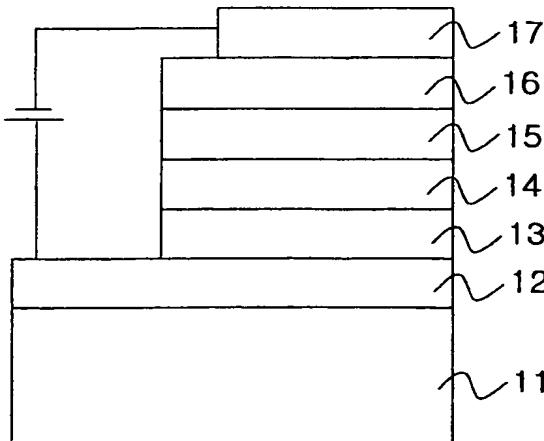
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(57) **ABSTRACT**

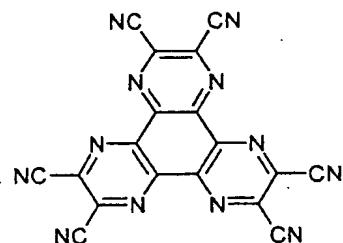
The present invention relates to electronic devices comprising an organic compound acting to inject or transport holes with p-type semi-conducting characteristics. The present invention provides for electronic devices comprising at least one or more layers selected from a group composed of a hole injecting layer, a hole transporting layer, and a hole injecting and transporting layer which comprises hexaazatriphenylene based organic compound represented by chemical formula (1), wherein the devices can use low drive-voltage, and can improve a light-emitting life.

31 Claims, 2 Drawing Sheets



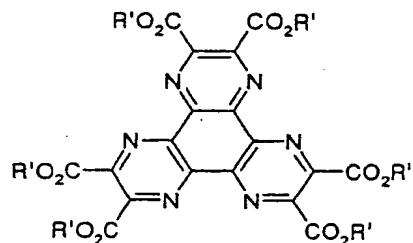
5.如申請專利範圍第1項所述的有機發光裝置，其中，化學式1的化合物用化學式1a表示：

[化學式1a]



6.如申請專利範圍第1項所述的有機發光裝置，其中，化學式1的化合物用化學式1b表示：

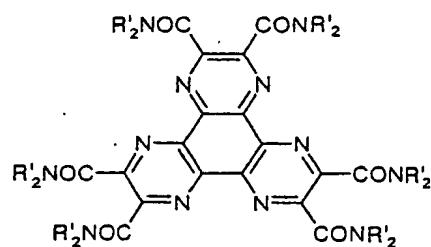
[化學式1b]



式中每個R'單獨或同時為有1-15個碳原子的烴、苯基或芳香基。

7.如申請專利範圍第1項所述的有機發光裝置，其中，化學式1的化合物用化學式1c表示：

[化學式1c]

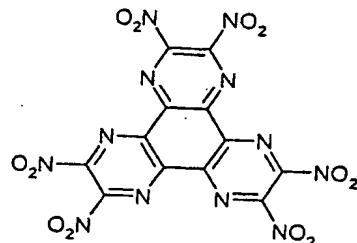


式中R'單獨或同時為有1-15個碳原

子的烴、苯基或芳香基。

8.如申請專利範圍第1項所述的有機發光裝置，其中，化學式1的化合物用化學式1d表示：

5. [化學式1d]



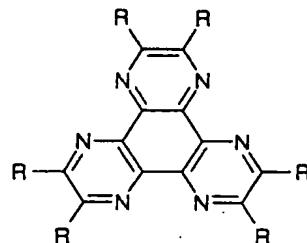
9.如申請專利範圍第1項所述的有機發光裝置，其中，含有由化學式1表示的有機化合物的層厚為10~10,000nm。

10.如申請專利範圍第1項所述的有機發光裝置，其中，含有由化學式1表示的有機化合物的層還含有一種從酞青銅絡合物、低噁吩、基於芳香胺的化合物和多環芳香族化合物中選擇的空穴注入材料。

11.如申請專利範圍第1項所述的有機發光裝置，其中，陽極含有一種導電聚合物或導電的金屬氧化物。

12.一種電子裝置，其含有至少一層或一層以上由空穴注入層、空穴輸運層、空穴的注入和輸運層中選擇的層，這些層含有一種由化學式1表示的有機化合物：

[化學式1]



式中每個 R 單獨或同時從氫原子、C1-12 烃、鹵素、烷氧基、芳香胺、酯、酰胺、芳香烃、雜環化合物、硝基和氰基(-CN)中選擇。

13.如申請專利範圍第12項所述的電子裝置，其中，該裝置是基於有機薄膜的電晶體、光伏特電池或基於有機光導體的磁鼓。

圖式簡單說明：

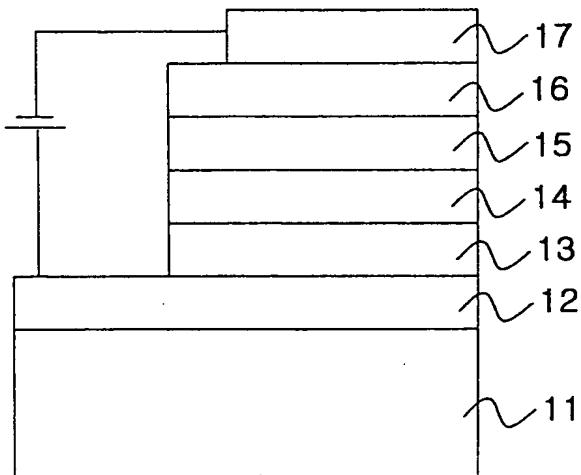
第一圖：係按照本發明一實施例的有機發光二極體的簡化橫截面圖。

第二圖：係按照本發明另一實施例有不同結構的有機發光二極體的簡化橫截面圖。

5. 係表示本發明的有機發光二極體的亮度和電壓之間的關係曲線。

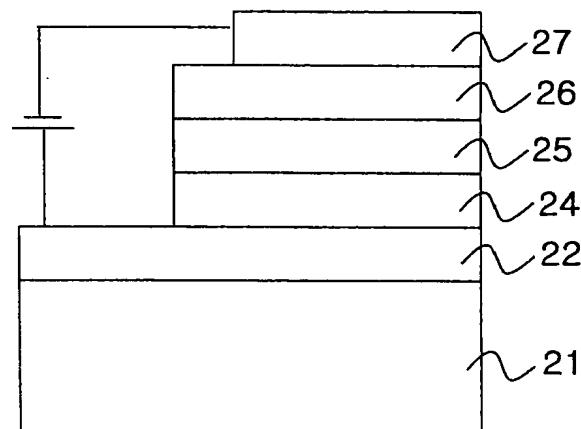
第三圖：係表示為了檢驗本發明中所使用物質的P型半導體特性而製作的裝置的電流密度和電壓之間的關係曲線。

10. 係曲線。

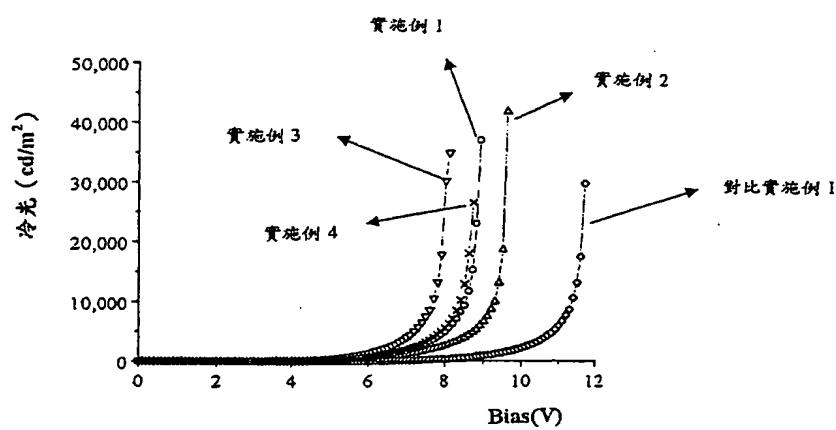


第一圖

(4)

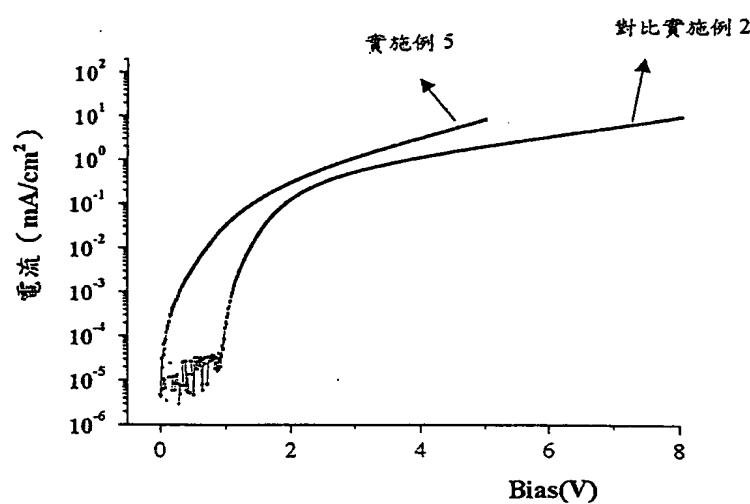


第二圖



第三圖

(5)



第四圖

